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Citizens Breaking out of Filter Bubbles: Urban Screens as Civic Media

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ABSTRACT
Social media platforms risk polarising public opinions by employing proprietary algorithms that produce filter bubbles and echo chambers. As a result, the ability of citizens and communities to engage in robust debate in the public sphere is diminished. In response, this paper highlights the capacity of urban interfaces, such as pervasive displays, to counteract this trend by exposing citizens to the socio-cultural diversity of the city. Engagement with different ideas, networks and communities is crucial to both innovation and the functioning of democracy. We discuss examples of urban interfaces designed to play a key role in fostering this engagement. Based on an analysis of works empirically-grounded in field observations and design research, we call for a theoretical framework that positions pervasive displays and other urban interfaces as civic media. We argue that when designed for more than wayfinding, advertisement or television broadcasts, urban screens as civic media can rectify some of the pitfalls of social media by allowing the polarised user to break out of their filter bubble and embrace the cultural diversity and richness of the city.

Author Keywords
Urban screens; social media; algorithmic filters; public sphere; civic engagement; community engagement; filter bubbles; echo chambers; democracy; smart cities; smart citizen; media architecture.

ACM Classification Keywords
H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

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INTRODUCTION

People have advanced from consumers to producers, from stationary office workers to mobile urban nomads, from passive members of the plebs to active instigators of change. Yet, HCI researchers and interaction designers often still refer to them only as "users." In this paper, we trace some of the historic developments from the information superhighway to the smart city in order to provide the backdrop in front of which we will critically link a challenge with an opportunity: The issue of echo chambers and filter bubbles in social media risks a political polarisation that jeopardises the formation of a functioning public sphere. At the same time, new digital display technologies offer opportunities to foster a real shift from 'slacktivism' to meaningful community engagement as pretty lights and colourful LED façades are increasingly making way for situated installations and civic interventions. We coalesce these two trends to propose the notion of '*citizen*-ability' as an alternative for interaction designers and practitioners to aspire to in order to step beyond '*use*-ability' for a better quality of life in cities.

Although we have studied the advantages of using social media for civic engagement [5, 7, 8, 11], we are also wary that incremental improvements to the same platforms will not bring about a quantum change in the practice and impact of civic engagement. However, we see potential in the socio-cultural diversity that cities offer [31]. This paper focusses on the touch points between "the city" and its civic body, the citizens. In order to provide for meaningful civic engagement, the city must provide appropriate interfaces. Such urban interfaces, for example in the form of pervasive displays, present an innovative avenue for addressing these issues by fostering depolarisation through engagement with civic media. Urban interfaces bring unique qualities, such as their ability to reach a diversity of citizens, and the absence or ability to tamper with, automatic content algorithms. This paper examines how the arrival and uptake of urban interfaces and situated civic media can be integrated into our city environments to reach, support and engage citizens. In this context, we are particularly interested in the ability of urban screens as a specific type of pervasive display to break echo chambers and burst filter bubbles.

With digital screen technologies advancing at a fast pace, new generations of screens are increasingly embedded in public spaces across the city. They range from large-scale public displays at iconic sites, such as Federation Square in Melbourne and Times Square in Manhattan, to an ever-increasing presence of LED screens installed at retail outlets, cafés, and public spaces. These screens offer new opportunities for providing dynamic information when and where it is needed (e.g., traffic conditions, bus arrival times, or local points of interest). However, the current use of many of these screens is often limited to wayfinding, advertisement, or simply, television broadcasts.

While the socio-cultural aspects of urban interfaces have been studied widely [2, 27, 28], there is as yet no theoretical framework that reflects both new technical capabilities and affordances and new emerging socio-technical practices with these new types of urban media. This paper offers an argument that calls for such a framework to be developed. Right now, current implementations of urban screens tend to either build on existing models of broadcasting information or advertising often unrelated to its location and audience [27], or use out-dated application models from the PC era to provide one-on-one user interaction, e.g., through touch.

We do not argue that such usages are necessarily a technical failure, as many design intents cannot easily be decoupled from commercial goals and interests. This leads us to think that more effort has to be invested in new business models. Our current selection of successful funding models for urban screens and public displays is rather limited. If we want to foster new socio-technical practices that are emerging from cultural and artistic explorations of urban screens, sustainable funding models have to follow suit that also go new ways in looking at commercial interests vs. the common good.

This paper uses a critical perspective to point out the need for new, theoretically informed studies into the specific interaction qualities and civic affordances that set urban screens apart from personal screens, such as laptops, mobile phones, tablets. Insights from such studies can be used to inform and test the design of novel interaction models and screen content applications fostering situated civic engagement that is audience and place-specific.

In this paper, we seek to lay some of the foundations for the PerDis community to be able to ask two research questions:

(1) How can urban interfaces (such as urban screens) be designed and deployed to counteract the increasing polarisation of ideas and opinions that is a result of our connectedness (via social media) to mostly like-minded people and content?

(2) How can urban interfaces provide a platform to help capture and disseminate community and civic information to a broader section of society who otherwise might not be easily exposed to the increasingly digital mediascape?

We will first present our rationale for looking at urban screens as a useful example of urban interfaces in the first place and illustrate this argument with recent statistics and a review of prior studies. We will then outline and explain the issue of opinion polarisation in social media, and argue why urban screens present themselves as a useful platform that can help to counteract this trend. We touch on the crucial issue of considering digital participation for both users and non-users of technology, before we present the concept for an urban screen content application that exemplifies our argument. We conclude with remarks around the impact that taking this direction would bring for communities and society.

URBAN SCREENS TODAY

Everyday technology has become increasingly ubiquitous: networked, embedded and accessible anywhere, anytime [10]. Dourish and Bell [6] argue that the design and development of ubiquitous computing (ubicomp) as well as the ability to access information in places other than the conventional desktop PC, call for a better appreciation of the "messiness of everyday life," which ultimately requires social and cultural research skills such as ethnographically informed approaches in addition to technical and design expertise. Williams et al. [29] point out that ubicomp innovations enable HCI designers to design for a diversity of urban environments and urban citizens, rather than being limited to universal and homogeneous design outcomes. We agree with Odendaal [18] who recommends critical and qualitative methods to *"understand differing ways of life [and] to reveal a diversity of urban experiences"* (p. 36). This can be achieved by studies that employ an innovative design research methodology considering *"urban experiences across different urban contexts that are created by new opportunities of real-time, ubiquitous technology"* [8, p. 4]. Such studies have to not only understand current practice that will inform theory, but also the design of future technology.

This paper departs from previous studies into urban screens [11, 24, 30]. McQuire [17] explored the potential for linking up large video screens in public spaces in Melbourne and Seoul for live events and to study the interplay between technology, policy, culture and user-led innovation in the context of networked public space. Although, at the time, his study was not able to examine the next generation of interaction possibilities on urban screens, his team recognised early on that urban screens have the *"potential to move beyond 'ambient television' to play a role in initiating new collective interactions in public space"* [17].

The increasing number of urban screens and other forms of pervasive displays is evidenced by a recently published market analysis that shows the average global consumer was exposed to digital signage, or 'digital out-of-home'

(DOOH) media, for 14 minutes per week in 2013, representing a 75% increase since 2007 [20]. The annual growth rate of DOOH exposure is forecast to be 8.6%. Although most digital public screens are used as mostly passive displays for advertising and are therefore far from providing a gateway to the digital city that engages citizens, the strong investment into DOOH media by the advertising industry is evidence of the significance of this new technology. For example, 7-Eleven operates a network of 12,400 screens through which they reach over 200M viewers monthly – making their screens network one of the largest TV networks in the U.S.

However, without theoretical and practical advancements, conventional urban screen deployments will continue to fail to meet the aspirations and expectations of citizens and communities [27]. Establishing an urban screen is associated with significant investment into human resources, technology platforms and support, screen operations and maintenance, client liaison, content curation and developing content partnerships, content licensing costs, and investment in events around these screens. This amounts to millions of dollars in highly visible risk investment over the life of any one screen.

State and local governments, industry, and educational institutions internationally wish to replicate the success of Federation Square Melbourne in public engagement without a clear understanding of what is required to succeed or the risks involved. Many existing screens are languishing as highly visible public demonstrations of the failure of these investments. A stark example is the BBC's withdrawal from its extensive Big Screens program (www.bbc.co.uk/bigscreens), leaving local governments across the UK with the responsibility of managing urban screens. Yet, without appropriate tools and know-how, these screens are now either switched off or broadcast muted free-to-air television. We argue that the particular qualities of urban screens offer a great opportunity to employ them in an attempt to counteract the systemic polarisation through algorithmic filters employed by social media platforms that isolates community opinions inside echo chambers and filter bubbles and thus diminishes the ability of communities to engage in robust debate in the public sphere.

ALGORITHMIC FILTERS IN SOCIAL MEDIA

In 2006, TIME Magazine published a picture of a computer on its cover as the "Person of the Year" with the words *"You. Yes, you. You control the Information Age. Welcome to your world."* The selection highlights the profound shift in the way that the world wide web has advanced to allow an increasing number of everyday people to not only access information, but contribute and participate in their own right. This trend has been popularised as, "Web 2.0," or "the social media revolution" – Jenkins [13] coined the term, "participatory culture." The ability for everyone to become a creator, publisher, remixer, recommender, sharer, and referrer has led to an exponential growth in content: Every 60 seconds on Facebook, 510,000 comments are posted, 293,000 statuses are updated, and 136,000 photos are uploaded (thesocialskinny.com). However, quantity of content does not imply quality, and thus with more sources of content, spread via more digital media channels, to more people, web users started to face the problem of information overload.

Corporations such as Facebook and Google have deployed sophisticated algorithmic filters and recommendation systems designed to help us navigate the otherwise bloated social mediascape. The content displayed on Facebook's news feed is selected based on a user's profile, their location, interests, habits, online transactions – what they post, share, recommend, and "like." Apple recently introduced their own News service (Figure 1), which heralds a new generation of personalisation – yet, what are we missing out on if our news are personalised in this way?

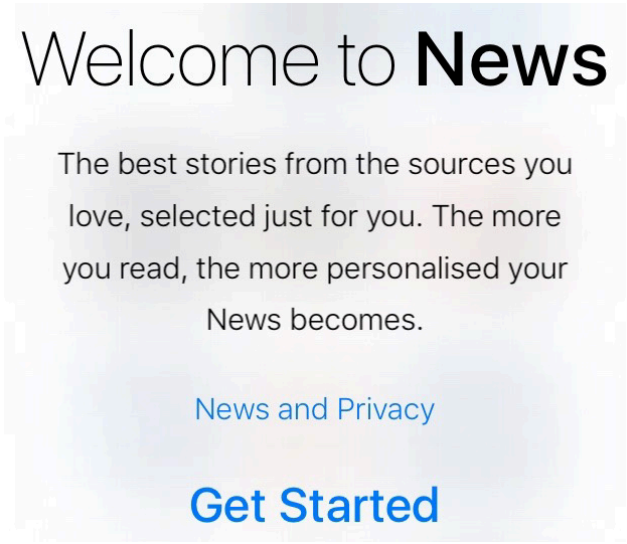

Figure 1: Apple News welcome screen

The popularity of social media stems from its power to create personalised spaces, walled gardens, which are tailored to individual preferences and favour content relevant to each user. An algorithm proprietary to each social media site determines what is deemed relevant and agreeable: With the absence of a journalistic or editorial code of ethics, these algorithms determine the make-up of the Facebook news feed, Google's top search results, and the recommendations on whom to follow on Twitter and what to buy on Amazon. They are optimised to prioritise content that will generate more traffic. Yet, Lotan [16] warns that, *"We're not seeing different viewpoints, but rather more of the same. A healthy democracy is contingent on having a healthy media ecosystem. As builders of these online networked spaces, how do we make sure we are optimizing not only for traffic and engagement, but also an informed public? … The underlying algorithmics powering this recommendation engine help reinforce our values and*

bake more of the same voices into our information streams."

The compounding aspects of this polarisation of opinions in social media have been studied in political science and media and communication studies, e.g., *echo chambers* [1] and *filter bubbles* [19]. We argue that urban interfaces such as urban screens provide an innovative avenue for addressing these issues by fostering depolarisation through engagement with civic media architecture. From small displays to screens spanning entire buildings, they are dispersed into all areas of public space from residential [32], communal [26] to commercial [11]. These screens complement the range of media and communication devices (smart phones, tablets, fitness trackers, etc.) that together provide a ubiquitous gateway connecting us to the physical and digital layers of the city. However, they also bring unique and largely untapped qualities, providing opportunities for future HCI and interaction design research, such as their ability to reach a diversity of citizens, and the absence of automated personalisation algorithms. They also offer complementary civic media channels that may enable non-users of social media to participate in different ways.

DIGITAL PARTICIPATION FOR USERS & NON-USERS

Not all people will welcome technological innovation [23]. The increasing digitisation of our cities has the potential to alienate and disenfranchise. This perspective is increasingly relevant as technology becomes more pervasive in all aspects of everyday life, and the socio-cultural implications of digital media increase. This is especially true with urban screens that expose their message to all who pass by. Rather than try to contextualise the screens for the needs of the technically savvy citizens, who will be likely to embrace their presence, it is essential to also incorporate the needs of 'non-users' into the design process [22].

Both Baumer et al. [3] and Satchell & Dourish [22] draw attention to the non-use of digital media and computing technology. Screens are more than technical installations and artefacts; from a socio-technical perspective we also need to consider them as situational resources [21]. They are environments that are socially and culturally constructed [12] to reflect the way in which their presence is conceptualised by those who interact with them, or choose not to. More research is needed that produces empirically-grounded understandings of the way in which urban screens are understood by their users and non-users alike [22] and provide alternative outlets for publishing information by local governments and citizens. We consider urban screens as an opportunity space to provide a platform to help disseminate community and civic information to non-users of conventional digital media who otherwise might not have access or be exposed to such information. Therefore, the urban screen, through its very ubiquity, becomes a valuable platform for engaging both non-users of mainstream digital media and users trapped inside filter bubbles. Urban media technologies can enable cities to better welcome and be accessible to a broader and more diverse section of its citizenry.

CIVIC MEDIA ON URBAN SCREENS AS SERENDIPITY ENGINES

We present the following example inspired by Zuckerman's keynote at CHI 2011 in Vancouver, BC, to illustrate the potential direction of our exploration: Civic Media on Urban Screens as Serendipity Engines. – *"If you want to explore beyond the places your friends think are the most enjoyable, or those the general public thinks are enjoyable, you need to seek out curators who are sufficiently far from you in cultural terms and who've annotated their cities in their own ways."* [33]

Figure 2: London is Changing. "This project is intended to facilitate discussion about the impact of economic and policy changes on the culture and diversity of London. Via a web form, we are asking a series of questions intended to capture a variety of personal stories and circumstances that will enhance understanding of broader demographic trends concerning migration into, out of, and around London. An edited selection of responses from the web form is currently on display on digital billboards in Central London and new responses are being added daily. Anyone who recently (within the past 12 months) or is planning (within the next 12 months) a move to, from, or around Greater London is invited to participate. This project will run throughout the 2015 calendar year." (Source: Dr Rebecca Ross, University of the Arts London, 2015, www.londonischanging.org)

This use scenario directly responds to our quest to break echo chambers and burst filter bubbles. A response to this challenge would have to address Zuckerman's call for *"creating structures, online and offline, to increase the chances of serendipity"* [33]. Such a design response may include curating a set of Twitter updates or user-produced videos on YouTube that are displayed with the particular goal of helping people understand the socio-cultural diversity of their urban environment. Rather than choosing content based on mainstream popularity, familiarity, and social media 'likes,' the mechanism for the serendipity engine will curate content (similarly to upworthy.com in response to [19]) that fosters people's understanding of their own place in the context of the *otherness* that cities offer [31]. Rather than tweets that are trending right here,

the screen may display tweets that are trending from a sub-cultural group of people of this city, or from citizens of another city or even rural area, or from a different demographic or minority group (e.g., Figure 2). This mechanism is different from being purely random, as Zuckerman [33] argues that serendipity requires *sagacity*, which in turn enables us to study how to better enrich the discovery and discourse in the public sphere. This exemplar design use scenario is congruent with the quest to develop a resilient citizenry that can thrive in an ever changing urban environment.

There are existing initiatives and projects at the intersection of urban media, community engagement, and citymaking, that illustrate two key trends with regards to the shifting agency of producing, installing and promoting interactive civic screens and the associated screen content.

First, although the first generation of urban screens were predominantly installed and operated by local government or commercial players, business models are changing towards more integrated partnerships that bring together non-profit and community groups, artists, academics, individual citizens, and local governments [7]. Two great examples of such efforts are (a) the *Screens in the Wild* program, which is a collaboration between The Bartlett at UCL and the Mixed Reality Lab at University of Nottingham in the UK (screensinthewild.org), and; (b) urban screen and media architecture projects by the Centre for Advanced Visualisation and Interaction (CAVI) at Aarhus University, such as *Climate on the Wall* [9] and *City Bug Report* [15].

Second, innovations in screen content applications not only enable new forms of citizen participation (e.g., reaching new user groups, using new input modalities such as touch or gesture, allowing new formats such as visuals or spoken words) – but also push the agency and limits of participation itself towards new frontiers. One area of interest that has been investigated is the concept of Do-It-Yourself (DIY) and Do-It-With-Others (DIWO) projects that enable community groups and citizens to not only participate (on the terms of the designers, owners, authors), but to use screen content applications as tinkering, prototyping and experimental platforms to be remixed, rethought, and re-deployed as *they* see fit for their own engagement agendas [5]. Examples of this trend include the *Smart Citizen Sentiment Dashboard* [4] and the *InstaBooth* [14].

CONCLUSIONS

As both technology and technological practice evolve, HCI has expanded its focus from the design and assessment of particular interaction styles, to encompass the role that interactive systems play in connecting people with their world. The focus of HCI is no longer grounded by the notion of the stationary user moored to a fixed desktop PC in an organisational context. Rather, people are interacting with technologies across many contexts and in all areas of their lives. The development of digital screens has similarly broadened. These days, people are not only exposed to a standard TV set at home and a desktop computer at work, but to a plethora of different screen-based interfaces that blur many of the previously drawn boundaries between home and work, mobile and static, local and global, online and offline, public and private. Despite an arguably richer and more nuanced perspective of *use* emerging from HCI research, there is a need to similarly extend the focus to encompass emerging urban screen interfaces. What is as yet missing is a more holistic and forward-looking assessment of ways in which humans interact with urban screens in different situations and contexts.

Civic media have significant, yet still largely unrealised potential to provide exciting urban experiences, useful information and opportunities to participate in city life [10]. In our future research, we plan to combine participatory and collaborative design thinking with experience design and data visualisation to investigate the potentials of urban interfaces for transforming cities into more liveable, sustainable and exciting precincts where the urban experience creates a deeper, more constructive and conscious daily engagement amongst citizens as well as between citizens and the public space.

Next steps. In order to start working towards answering the two key research questions we posed in the beginning (counteracting the increasing polarisation of ideas and opinions, and broadening the reach of urban interfaces), we have drafted a research plan.

In our proposed study, we emphasise sagacity over random chance in our interpretation of serendipity. We will examine the potential for urban screens (and other forms of urban interfaces) to deliver a diversity dividend and increased innovation capacity. The aim is to amend and employ novel algorithms for the sagacious discovery of *difference* in the city through serendipitous encounters with people, places and content. We are hoping to employ a research-through-design approach to create an empirically-grounded theoretical framework. It in turn will inform the development of novel urban screen applications that unlock the diversity advantage of the city.

The study's design ideation around the three themes of people, place, content will be informed by related projects and studies that sought to foster serendipitous discovery in the city:

- **People:** *Familiar Strangers* [20] – connecting strangers in public spaces; Rebecca Ross's *London is Changing* (londonischanging.org) – visualising local voices from diverse communities.
- **Place:** Mark Shepard's *Serendipitor* – a component of the Sentient City Survival Kit (serendipitor.net); *Likeways* app (@LikewaysApp; Figure 3) – providing alternative routing allowing you to lose yourself in your city and discover new parts of it [25].

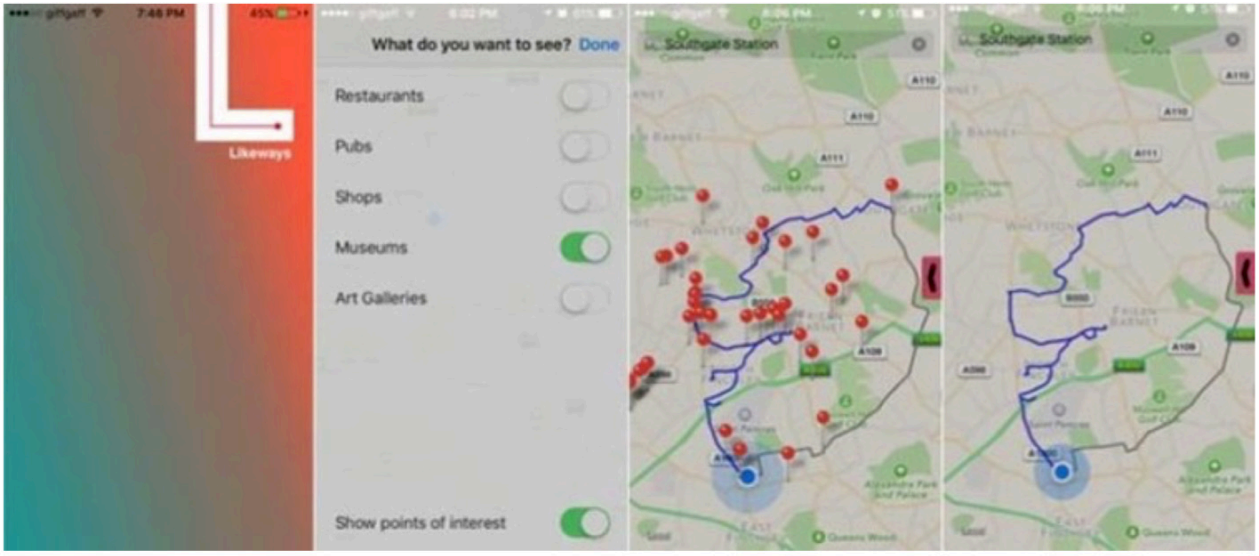

Figure 3: The Likeways app lets users choose routes that wander past restaurants, pubs, shops, museums or art galleries. Screenshot, courtesy Martin Traunmueller, twitter: @LikewaysApp.

- **Content:** *upworthy.com* – new form of news curation, ie. news you should read rather than just "the news you want" to read, and; the *Delphi* method as a *dialectic* process to build agreement from disagreement – as an alternative to conventional consensus or adversarial / antagonistic approaches to discourse (aral.com.au/resources/dialectic.html).

Our chosen focus for this approach is purposefully limited to reconceptualising the way algorithmic filters work. However, we acknowledge further challenges ahead, not just technical or theoretical, but with regards to identifying sustainable funding models and tackling issues of 'street credibility' and ethics in content curation and moderation strategies.

In this paper, we hypothesised that the specific interaction affordances of urban screens situated in public space can contribute to a depolarisation across a diversity of citizens, as well as a two-way communication flow that is useful to both citizens and city governments. This is significant for its contribution to enhancing governance systems and decision frameworks, maximising social participation in society, and ultimately contributing to a healthier public discourse in a strong, resilient, and thriving deliberative democracy.

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